

# Social Divergence and Productivity: Making a Connection

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## INTRODUCTION

The purpose of this chapter is to explain how social divergence affects labour productivity and total factor productivity (TFP).<sup>1</sup> We define social divergence as the social barriers to communication among social groups and hypothesize that social divergence inhibits the growth and diffusion of knowledge, which, in turn, lowers TFP and labour productivity. Social divergence may be proxied by the number of social groups and the “distance” between them in an economy. In practice, proxies may include inequality measures of income, wealth and education, and societal differences in terms of religion, language and ethnicity. These differences across groupings, all other things being equal, increase the social barriers to communication that, in turn, prevent the exchange of ideas that enhance productivity and contribute to economic performance.

Despite difficulties in measuring TFP over time and across countries (Diewert 2000), analyses of the factors that cause (or are associated with) productivity changes are becoming increasingly important, and conclusions

based on such evaluations are used to justify a range of economic and social policy initiatives. In Canada, various explanations have been offered to explain domestic TFP performance, particularly in comparison with its southern neighbour.<sup>2</sup> Harris (2002) lists 13 variables possibly associated with TFP, including marginal tax rates, the rate of inflation, income inequality, labour mobility and the size of the public sector. We broaden this debate to focus on social divergence and “make a connection” that may help to explain some of the cross-country differences in TFP and other stylized facts.

This chapter is a first step in examining the extent to which social barriers to communication across groups determine productivity differences. The objectives of the study are twofold: to place the notion of social divergence in the context of the existing literature, and to provide some preliminary empirical evidence on the effects of different aspects of social divergence on TFP and labour productivity. First, we define the concept of social divergence and outline hypotheses as to why it may negatively affect TFP. Then, we move on to contrast social divergence with existing concepts

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such as social cohesion, social diversity and, in particular, social capital. A key aim of this comparison is to emphasize the distinct and sharp focus of social divergence compared to broad, encompassing concepts like social capital. The study also provides a review of the social capital literature related to economic performance to highlight the differences between social capital and social divergence and their expected impacts on TFP. The review of past work provides a point of departure to the presentation of new empirical results on the statistical relationships between social divergence and TFP and labour productivity. The preliminary nature of these results provides an opportunity to discuss the need for further research and the policy implications of the study, especially for Canada. The concept of social divergence, the preliminary evidence of its impact on TFP and labour productivity, and its policy implications are reviewed in the concluding remarks.

#### SOCIAL DIVERGENCE AND TOTAL FACTOR PRODUCTIVITY

The first step in appreciating the importance of social divergence is to observe that humans (and other primates) have a tendency to associate and communicate with others with whom they can identify. Group identification of “like with like” occurs on multiple levels and on both a social and a professional basis. In traditional and pre-literate societies, bonds between members of groups are often based on kinship (Dunbar 1996). In modern societies, however, the bonds within groups may arise from various commonalities. For example, people often associate with others in the same age group and of similar

income or levels of wealth, cultural background, education and marital status.

From our observation of the like-with-like association in human behaviour, we hypothesize that the greater the similarity of social characteristics between individuals, the lower the social barriers to communication. We further hypothesize that the lower the social barriers to communication in terms of costs or effort, time and dissonance associated with social interactions, for a given level of potential gain from specialization, the higher the incidence of mutually beneficial knowledge exchange. In other words, social barriers to communication across groups — social divergence — may prevent individuals from transcending their knowledge set and hinder “cooperation among highly specialized workers that enables advanced economies to utilize a vast amount of knowledge” (Becker and Murphy 1992, 1144). If religious, ethnic, educational, wealth or other social characteristics hinder communication across groups, the economic impact is likely to be greater on long-term TFP than on factor accumulation. This is partly because spillovers of technological knowledge between agents are likely to be more important than spillovers from factor accumulation, given that “technological knowledge is inherently more nonrival and nonexcludable than factor accumulation” (Easterly and Levine 2001, 208). Thus communication barriers that arise from social divergence, and that hinder disembodied technical change, are likely to be significant impediments to technological progress.

Barriers to communication can be characterized in terms of the configuration of networks linking individuals in a society. This view is consistent with recent work in network sociology showing that the structure of networks has a

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significant effect on the distribution of resources, including information, that flow through them (e.g., Burt 2000; Moody and White 2000).<sup>3</sup> In particular, social networks are more important in the transfer of “tacit knowledge/know how” than “explicit knowledge/know what” (Brown and Duguid 2000). Figures 1 and 2 illustrate the potential effects of social divergence. In Figure 1, social divergence prevents communication between individuals in group A and individuals in group B. We assume no social barriers to communication between individuals within a group and, in this extreme example, suppose that social barriers to communication are so prohibitive that no communication links exist between the two groups. Thus, with social divergence there are only two productivity-enhancing exchanges or communication links in the whole society. Figure 2, by contrast, shows that in the absence of social divergence there are six communication links.<sup>4</sup>

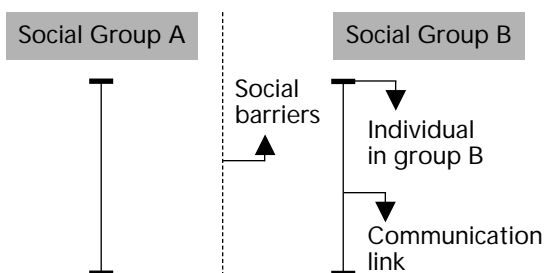
The figures illustrate the potential “increasing returns” in the number of exchanges from a decline in social barriers and social communication costs across groups. For example, for an economy with  $N$  individuals, there exist  $N(N-1)/2$  possible pair-wise communication links. If the economy were divided into  $M$  social

groups, each containing the same number of individuals, with no communication links across groups, then the maximum possible number of pair-wise communication links within each group would be only  $N(N-M)/2M^2$  and for the society as a whole  $N(N-M)/2M$ , which is strictly less than  $N(N-1)/2$ , if  $M$  is greater than one. Thus, the larger the economy (defined by  $N$ ) and the number of social groups ( $M$ ), the greater the potential benefits from a lowering of social barriers to communication, all other things being equal.<sup>5</sup> An ideal economy is one with large complementarities in knowledge across individuals but with low social barriers to communication, so as to maximize both the number and the quality of exchanges between individuals and across social groups.

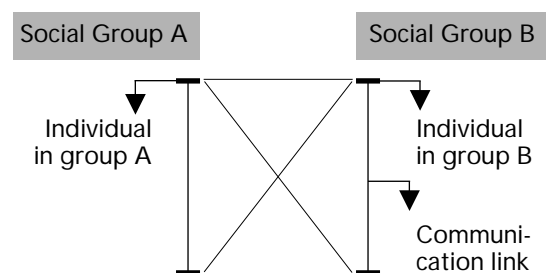
The social divergence view has commonalities to Lazear (1999), who argues that a common culture increases the pool of potential trading partners; the lack of a common culture inhibits the circle of contacts, which may leave economies of scale unexploited. Lazear focuses specifically on a common language, with an emphasis on opportunities to trade. The social divergence hypothesis, by contrast, emphasizes that the lack of a common culture will create communication barriers, inhibiting the diffusion

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**FIGURE 1**  
Communication Links with Social Barriers that Prevent Any Communication Across Groups (Communication Links = 2).



**FIGURE 2**  
Communication Links in Absence of Social Barriers to Communication (Communication Links = 6)



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of ideas and knowledge and reducing productivity. The notion of social divergence is also consistent with the empirical work of McCallum (1995) and Helliwell (1999), who show that border effects reduce trade flows by up to a factor of 20 for the United States and Canada, despite a free-trade agreement. Similar results have been found for the European Union (Nitsch 2000) and are consistent with the finding that a common language significantly increases trade densities between countries (Wei 1996). These studies do not focus on social divergence, but it seems likely that if differences in culture reduce trade, they will also create communication barriers.

Closer to our interpretation of social divergence are aspects of a theoretical model developed by Gradstein and Justman (2000) to examine the role of state schooling, as a source of common socialization, in reducing the social distance between individuals. They assume that the social distance between agents affects the productivity of human capital in transactions, citing Lazear's arguments but also referring in general terms to empirical work on social capital and the effects of ethnic heterogeneity. However, apart from a passing comment that their focus is "the negative impact of economic performance of people lacking the means to communicate effectively with each other" (fn. 4), they do not consider the broader implications in any detail.

Social barriers can also affect the rate of technological progress through the misallocation of skills across occupations. Galor and Tsiddon (1997) examine the relationship between technical progress and wage inequality. In their model, the rate of technological progress and growth is determined by intergenerational earnings mobility, while technical progress, in turn, plays a part in determining the evolution of earnings inequality and inter-

generational earnings mobility. Although not explicitly modelled, their analysis suggests that social barriers to mobility may distort the allocation of skills across occupations, hence reducing the rate of technological innovation and growth. From a social divergence viewpoint, a lack of social mobility will also reduce technological progress because it reinforces barriers to communication, hindering the implementation of best-practice techniques.

Social divergence does not imply that it is desirable for every individual to be identical. Some degree of diversity is likely to be beneficial; indeed, the value of communication between people of different backgrounds has long been recognized.<sup>6</sup> However, our contention is that the extent of communication barriers is an increasing function of the social distance between individuals, and that — other than, possibly, at relatively low levels of social distance — the negative effects of diversity on TFP will dominate any potential gains from diversity.<sup>7</sup> A key point is that social divergence tends to impede the exchange of information, regardless of the extent and distribution of potential productivity payoffs, partly because such payoffs are unknown due to the lack of communication between groups. Thus social divergence, by increasing the social barriers to communication, prevents productivity-enhancing exchanges between social groups, *even if* such potential benefits are greater for across-group interactions than within-group interactions.

## SOCIAL DIVERGENCE AND SOCIAL CAPITAL

To fully understand the concept of social divergence we must review a number of related concepts (e.g., social cohesion, social exclusion, social capital, social capability, social

diversity/heterogeneity, social polarization). These related concepts, associated with societal features of interactions between individuals and groups, have become widely used in theoretical and empirical work in the social sciences in recent years and have also become central to public policy discussions. Given the range of existing labels, the introduction of yet another — social divergence — requires some justification. Our view is that social divergence is both different from and more focused than existing concepts. A particular concern with several of these is their vagueness, as reflected in a worryingly long list of alternative definitions for the same entity, leading some to wonder whether we can “trust” such concepts (Sobel 2002).<sup>8</sup>

The term “social cohesion,” for example, has been variously applied — with different meanings — in the social sciences. In sociology, it has been defined as outcomes of processes whereby individuals become linked to social systems (Barchas and Mendoza 1984). It has also been defined in terms of network connectivity, as “the minimum number of actors who, if removed from a group, would disconnect the group” (Moody and White 2000, ii); cohesive groups are those that are well-connected and difficult to break apart. Ritzen et al. (2000) define social cohesion as “a state of affairs in which a group of people...demonstrate an aptitude for collaboration that produces a climate for change” (6). In other words, it occurs when individuals and groups have the means, willingness and opportunity to collectively participate in improving society. According to Ritzen et al., “social exclusion” and social cohesion can be viewed as “two sides of a coin,” with the main causes of social exclusion ascribed to poverty, unemployment, lack of access to rights, and development that com-

promises future generations. Any attempt to reconcile the differences in and linkages between definitions for the various concepts is beyond the scope of this paper. However, it should be noted that none of these interpretations of social cohesion or social exclusion highlights the barriers to communication, and the consequent implications for TFP, that result from social divergence.

Most views of social cohesion (Berger-Schmitt 2000) and other broadly defined concepts such as “social capability” (Temple and Johnson 1998) explicitly or implicitly embrace social capital as an important dimension. We therefore concentrate, in the rest of this section, on social capital as an example of a concept with a broad (and malleable) definition and compare it with the more focused notion of social divergence.

#### Trust and Ease of Cooperation

Paldam (2000) identifies three “families” of definitions of social capital, those based on “trust,” “ease of cooperation” and “networks.” Putnam (1993) emphasizes ease of cooperation in his earlier definition of social capital as the “features of social organization...that facilitate coordination and cooperation for mutual benefit” (35-36); this is reflected in his choice of the density of voluntary organizations and the extent of associational activity as proxies for social capital. Others (e.g., Fukuyama 1995; Knack 2001) stress the importance of trust, particularly “generalized” or “wide-radius” trust, for national economic performance; this is mirrored in the widespread use of survey measures of trust in empirical work (e.g., Zak and Knack 2001). Paldam (2000) argues that, together trust, which he views as constituting the “deepest definition of social capital,” (629) and cooperative behaviour form “a solid basis for social capital” (636).

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Even if we focus solely on trust, important distinctions can be drawn within the concept. James (2002), for example, distinguishes between trust that is fostered through incentives and trust whereby “players retain a vulnerability to the actions and choices of others” (293). The former is the type of trust that can be engendered through reward and/or enforcement mechanisms, as represented in prisoner’s dilemma games by changing preferences, by introducing explicit or implicit contracts, or through repetition. The latter is closer to what is popularly regarded as trust. Durlauf (1997) argues that trustworthiness is “cooperative behavior that occurs in the absence of either an enforcement mechanism or the prospect of future reward, and is perhaps better thought of as an internalized ethical norm,” but “[e]xplaining ethical behavior is very different than explaining adherence to socially-enforced norms” (262). The point is that broadly defined labels may obscure subtle but important differences among various mechanisms. If the aim is to analyze the implications of or to promote the notion of different types of trust, then a more focused approach is desirable.

Zak and Knack’s (2001) model, which examines the role of social distance, or “social heterogeneity,” in building generalized trust, illustrates an important difference between trust-based social capital and social divergence. In their principal (investor)-agent (broker) model, the greater the social distance between randomly matched investors and brokers, the greater the likelihood that cheating will occur. Investors can forego resources to monitor their investments and hence check on the honesty of brokers. Zak and Knack’s approach is based on the existence of transactions costs in monitoring and enforcing contracts, but it does not capture the barriers to communication that result from social divergence, nor does it

address the importance of these barriers in hindering disembodied technical change. The economic importance of social divergence lies in the reduced exchange of ideas and knowledge, rather than in the increased transactions costs associated with the exchange and enforcement of property rights.

### Networks

More recently, there has been an emphasis on the “networks” interpretation of social capital, as epitomized by Putnam’s (2000) more encompassing definition of social capital as “connections among individuals — social networks, and the norms of reciprocity and trustworthiness that arise from them” (19). Paldam (2000) takes a positive view: “The network definition fits rather well into the trust-cooperation definitions. Everything might be shades of and approaches to the very same basic phenomenon” (641). By contrast, Woolcock (2001) argues that definitions of social capital should emphasize its sources (“norms and networks that facilitate collective action”) rather than its consequences (e.g., trust).<sup>9</sup> A disadvantage of any all-encompassing definition of social capital is that it encourages researchers to regard beliefs, behavioural norms and networks as capable of being lumped together, which obscures different potential mechanisms and effects (Dasgupta 2000).

Unpacking the different elements contained in encompassing concepts such as social capital or social cohesion requires a sharper focus on the various mechanisms involved in economic performance. This is one of the motivations for the specific focus, in the social divergence approach, on social impediments to interaction among individuals and the exchange of the ideas and knowledge that lead to innovation and diffusion of productivity-

enhancing methods.<sup>10</sup> Social divergence is more closely associated with the “networks” view than the trust, norms or cooperation aspects of social capital, but its focus is information flows and the impediments that arise due to “fractures” in the network structure resulting from different dimensions of social distance.

Social divergence can also have direct effects on economic performance, unrelated to the trust-civic engagement axis included in most definitions of social capital (a point seen by Knack [2001] as a criticism of using measures of ethnic diversity, inequality, etc., as proxies for social capital). For example, Temple and Johnson (1998) argue that a robust correlation between their index of mass communications and growth could exist because the former is a good proxy for the level of civic engagement, as measured by the World Values Survey data on trust and membership in associations. From the viewpoint of the concept of social divergence, however, no indirect effect is required. Mass communications reduce the physical barriers to communications that partly mitigate social divergence and thus can promote the exchange of ideas and knowledge that lead to TFP gains.

#### Bonding, Bridging and Linking Social Capital

Although they are different concepts, social divergence and social capital are nonetheless related. For example, different dimensions of social divergence (ethnic diversity, income inequality, etc.) will affect levels of trust and civic engagement (Zak and Knack 2001). Further, a networks perspective of social capital, including the distinction between “bonding,” “bridging” and “linking” social capital (Woolcock 2001; Narayan 1999; Putnam 2000), complements the focus of social divergence.

Bonding social capital involves linkages (usually “strong ties”) within groups of like-minded individuals (e.g., families, clans, gangs), corresponding to denser, more localized networks. In this sense, bonding social capital is similar to the idea, first formulated by Davis (1967), that a society can be divided into clusters whereby within-group cooperation does occur but group-to-group cooperation does not. Bridging social capital involves linkages, usually somewhat “weaker,” among heterogeneous groups. Linking social capital refers to “vertical” connections among different strata in a hierarchical structure, with respect to, for example, wealth or power. Social divergence focuses on dimensions of social distance that act as impediments to linkages among groups; these are likely to be reflected in lower levels of bridging and linking social capital among groups distributed along the relevant dimensions of social distance. Knack (2001) notes that such factors affect not only overall trust levels but also the radius of trust; for example, in ethnically diverse societies there may be high levels of trust within ethnic groups but low levels of generalized (wide-radius) trust. Impediments to like-with-like interactions, while suggesting a lack of bridging and linking social capital, are not necessarily associated with high levels of bonding social capital. For example, groups with low income or educational levels are less likely to have strong within-group identification than, say, minority ethnic groups.

The fact that social distance with regard to dimensions such as ethnolinguistic or religious background can have an adverse effect on productivity does not imply — it should be emphasized — that social homogeneity is optimal. Diversity is a source of potential gain from specialization and exchange. The essence of the social divergence argument is that social

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barriers to the flow of information across transactors or groups of transactors will, to some degree, prevent the benefits of diversity from being realized. The challenge for Canada and other socially diverse countries is to overcome, through institutional improvements, the impediments to communication among groups with different ethnic, religious, educational or resource characteristics, in order to achieve the full social and economic benefits of diversity.

## 210 INDICATORS OF SOCIAL DIVERGENCE

We hypothesize that social barriers to communication can result from differences in ethnolinguistic background, religion, income or asset holdings, educational attainment and national boundaries. Each of these variables has been featured, usually in a piecemeal fashion, in theoretical and empirical studies of economic growth. For most of the variables, different mechanisms have been hypothesized to explain the connection with growth. These indicators are briefly discussed below, together with some details of relevant empirical work and the specific measures used to proxy the different aspects of social divergence.

### Ethnic and Religious Diversity

The economic effects of polarization of societies along ethnic lines have received considerable attention in the development literature, and many of the issues are also applicable to developed economies. The main mechanism by which ethnic diversity affects output growth is usually argued to be an excessive rent-seeking focus on the distribution of output among competing interest groups, determined by ethnic background, at the expense of policies that are growth-promoting.<sup>11</sup>

Fractionalized interests are reflected in incentives by local and national governments that lead to sub-optimal outcomes such as a lower quality and quantity of public goods (Alesina et al. 1999), lower educational levels (Goldin and Katz 1999), political instability (Mauro 1995), vulnerability to external terms-of-trade shocks (Rodrik 1999) and lower levels of trust (Zak and Knack 2001; Alesina and La Ferrara 2000). Barro (1997, 72) also observes that such diversity may reduce the likelihood of a society becoming or remaining a democracy. Where democracy does not exist, development-impeding institutions may form a “trap” whereby exploitive institutions and severe inequities are mutually reinforced (Grafton and Rowlands 1996). More generally, social polarization (usually characterized by the existence of a small number of similarly sized groups that differ markedly on a range of attributes) may reduce the stability of government decision-making (Keefer and Knack 2000), leading to increased uncertainty. This in turn is compensated for by investors investing in less risky enterprises.

Easterly (2001a) observes that the impact of ethnic diversity on economic growth hinges on a society’s institutions: the poorer the quality of those institutions, the more adverse the impact. Unfortunately, “good” institutions are less likely to exist in a society characterized by ethnic diversity. Even where institutional structures are relatively well developed, the expected productivity of rent-seeking activity is a key determinant; for example, Osborne (2000) notes that a well-established and accessible legal system (usually regarded as useful in protecting property rights) may encourage rent-seeking activity through litigation, so that redistributive tendencies, while less obvious, may still be present.



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In addition to the studies cited above (some of which use US data), cross-country empirical evidence supports the view that ethnolinguistic diversity is a predictor of conflict, political instability, and growth-retarding institutions and policies (Easterly and Levine 1997). Nettle (2000) finds a significant negative association between linguistic diversity and the level of per capita GDP.<sup>12</sup> Easterly and Levine's work is representative of most cross-country studies of the effects of ethnic diversity in using an index of ethnolinguistic fractionalization (ELF), developed by Soviet researchers and first used in the growth literature by Mauro (1995). The ELF index measures the probability that two randomly selected individuals in a country belong to different ethnolinguistic groups.<sup>13</sup> From the perspective of social divergence, ethnolinguistic differences should affect TFP and disembodied technical progress rather than investments of physical inputs into the production process, although these mechanisms are not mutually exclusive.

The argument that religion affects economic performance dates back to Max Weber's arguments concerning the "Protestant ethic." In this vein, proportions of the population that belong to major religious groups are sometimes included in estimated models explaining growth and related variables; for example, Barro (1997) provides evidence of an association between religious affiliation and democracy. He observes that Protestant countries are almost exclusively democratic while Islamic nations are not. Zak and Knack (2001) observe that "[t]wo of the three hierarchical religion variables — percent Catholic and percent Muslim — are negatively and significantly associated with trust" (310). Religious diversity is conventionally measured using a

Herfindahl-style index by summing the squared proportions of the population accounted for by each religious group (Grafton et al. 2001; Paldam 2001). The effects of religious diversity are often considered together with ethnolinguistic differences — for example, with respect to the potential for political and social instability and the other effects noted above. By contrast, there is some evidence that religious diversity may reduce corruption, with positive consequences for economic performance (Paldam 2001).

### Income and Asset Inequality

A large literature emphasizes the relevance of income inequality as a causal factor in the growth process. High levels of income inequality are hypothesized to reduce growth by influencing the level of savings and investment; by increasing rent-seeking activities and policies, such as high marginal tax rates, that may hinder growth (Persson and Tabellini 1994); by reducing human capital accumulation due to borrowing constraints and indivisibilities in investment (Galor and Zeira 1993); by reducing the size of markets and the ability to capture increasing returns (Murphy et al. 1989); by leading to a lack of political consensus and a breakdown of democratic institutions, resulting in reduced investment and hence growth (Benhabib and Rustichini 1996); and by reducing the security of property rights (Keefer and Knack 2000). Some of the earliest work on income inequality and growth, however, stresses that rising income levels can affect income inequality. For example, Kuznets (1955) hypothesized and observed that income inequality may rise, along with income levels, as migration from rural to urban areas initially widens the rural-urban income divide, but that income inequality will eventually reach a

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turning point and then decline as income increases further. Aghion et al. (1999), who review and evaluate some of the growth-inequality theoretical mechanisms, also emphasize the two-way relationship. However, they focus on the issue of technical progress and inequality, noting in particular that technological progress that differentially affects productivity of different types of labour is a key source of income inequality.

212 The empirical evidence on inequality and growth is mixed. Persson and Tabellini (1994, 607) find that a one-standard-deviation increase in the income share of the top quintile lowers average annual growth rates by just under half a percentage point. Alesina and Rodrik (1994), using different data, find a negative correlation between income inequality and subsequent economic growth. Perotti (1996) and Clarke (1995) also find evidence of a negative relationship between growth and inequality. By contrast, Forbes (2000) finds a positive relationship between inequality and growth using panel data for a cross-section of countries.

Most empirical testing has focused on the effect on growth of income inequality rather than asset inequality, even though the theoretical models are mostly concerned with asset inequality. However, some recent empirical studies — for example, Birdsall and Londoño (1997), Deininger and Squire (1998) and Deininger and Olinto (2000) — examine the role of asset inequality in growth equations. Deininger and Olinto, using a Gini coefficient for land distribution as a measure of asset inequality in a cross-country analysis, find that asset inequality has a statistically significant and relatively large negative effect on growth but that income inequality does not. As with the measure of ethnolinguistic diversity, the empir-

ical studies tend to focus on the effects of inequality measures on overall economic growth rather than on TFP, which is emphasized in social divergence arguments.

### Educational Inequality

Building on the relevance of human capital for growth and productivity (see Temple 2000 for a recent survey), there is a growing literature on the potential effects of educational inequality on levels or growth rates of output per capita. The usual argument (e.g., López et al. 1998) is that non-market mechanisms, and factors such as parental income, supply constraints and location, determine the allocation of education. As a result, there are likely to be significant differences in marginal products of education across individuals that are not explainable in terms of variation in ability. This implies that the distribution of education will affect the level of output per capita. A complementary explanation, suggested by the social divergence approach, is that educational inequality, a proxy for social divergence, hampers the transfer of information and ideas.

Birdsall and Londoño (1997) find that initial levels of educational inequality, measured by the standard deviation of schooling, are significantly correlated with subsequent economic growth. More recently, Gini coefficients for education have been constructed using different vintages of the Barro and Lee (1993, 1996, 2001) data on educational attainment. López et al. (1998) estimate educational Gini coefficients for 12 countries, expanded to 20 countries in the work reported in Thomas, Dailami, et al. (2000). Thomas, Wang, et al. (2000) calculate educational Gini coefficients for 85 countries, covering a wide range of developing and developed economies, for the period 1960-90. The (preliminary)

empirical work presented in these papers suggests that growth in income per capita is negatively associated with educational inequality. This finding is supported by the results of Castelló and Doménech (2001), who calculate educational Gini coefficients and the distribution of education by quintiles, from the Barro and Lee (2001) data, for 108 countries at five-year intervals from 1960 to 2000 and report a tendency for educational inequality to decline in most countries. For the full sample, which includes wide diversity in levels of development, there is a strong negative (though seemingly non-linear) association between average years of schooling and educational Gini values.

While countries with lower levels of human capital can have markedly different distributions of education with comparable average years of schooling, economies with higher levels of human capital (average years of schooling) have relatively equal distributions. In OECD economies, therefore, compared to developing economies, educational inequality may have less effect on growth, independent of the level of human capital. By contrast, issues of quality and type of education and training, which are not captured in the average years of schooling measures, are likely to be more important in developed economies.

#### National Boundaries

National boundaries are a defining feature of national identity and hence a potential impediment to communication, particularly when reinforced by language differences. This may be one reason why trade densities are so much greater within countries than across countries and why distance effects are many times larger than can be explained by trans-

portation costs (Hazledine 2000; Helliwell and Verdier 2001).

Many authors have assessed the effects of trade orientation on economic performance. Most of the empirical studies have used cross-sectional data and analysed the effect in terms of economic growth (Dollar 1992; Harrison 1996; Edwards 1998). Miller and Upadhyay (2000) specifically address the effect on TFP of human capital and openness to trade in a pooled cross-section of countries using time-series data. They find that the greater the openness, the higher the level of TFP — a result that holds for low-, middle- and high-income countries.

#### Connections Between Indicators

The different indicators of social divergence are clearly not independent. Ethnic, linguistic and religious differences will sometimes be correlated, although, surprisingly, there is only a small positive correlation between measures of income and human capital inequality (Castelló and Doménech 2001). Further, in situations where, for example, income inequality and ethnic diversity coexist, their negative effects on economic performance can be mutually reinforcing.

Easterly (2001*b*) presents evidence of a “middle-class consensus.” In a cross-country context, consensus is defined as a high share of income for the middle of the income distribution (quantiles 2 to 4) and a low level of ethnic division (measured by an ELF index). Easterly finds that such a measure is positively associated with the level and growth rate of income per capita, levels of educational and health components of human capital, infrastructure, a range of indicators of favourable economic policy, democracy, political stability, urbanization and proxies for a more “modern” economy.

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### Subjective and Objective Measures

214 In summing up the empirical literature, we should acknowledge that the chosen proxies for social divergence in empirical work measure “objective divergence” rather than “subjective divergence.” Objective divergence could be thought of as the number and size of gaps between individuals, or social distance. For example, educational diversity is a function of both the number of educational groups and the objective distance (in terms of years of schooling) between groups. The subjective component of social divergence refers to how large a gap this creates between individuals in terms of barriers to communication, which can differ across time and space. It is possible that in some societies university graduates do not interact with the unschooled and in some societies they do. To give a different example, the Catholic-Protestant distinction is more likely to create barriers to communication in Ulster than in Ontario.<sup>14</sup> Although subjective divergence is not unimportant, it is not clear how it could be measured in an aggregate cross-country context. In the following section, we address the issue of measurement and the significance of objective measures of social divergence for both labour and TFP.

### TOTAL FACTOR PRODUCTIVITY, LABOUR PRODUCTIVITY AND SOCIAL DIVERGENCE

Despite the huge literature relating social factors to various measures of productivity, only one study has empirically tested for the significance of social divergence on TFP. This study, Grafton et al. (2001), regresses the Hall and Jones (1999) estimates

of TFP on proxy measures for social divergence using data for a cross-section of 31 developing countries,<sup>15</sup> and tests whether the broad objective measures of social divergence have a significant and negative effect on TFP. The chosen measures of social divergence used in the study include an ELF index, an index of religious homogeneity, a measure of educational distance and a Gini coefficient for personal expenditure.<sup>16</sup> The results suggest, separate from any effects due to factor accumulation, that higher levels of social divergence are associated with lower levels of TFP and that these effects are quantitatively significant.

Using a much larger cross section of countries than in Grafton et al. (2001), we investigate here the association between estimates of output per worker (or labour productivity) and TFP (Hall and Jones 1999) and various indicators of social divergence.<sup>17</sup> The chosen indicators are a measure of religious homogeneity, an educational Gini, a land-ownership Gini and an ELF index. The religious homogeneity measure (RH) is constructed for 1980 from data presented in Barrett (1982). This index measures the probability that two randomly selected individuals will have the same religious affiliation. The educational Gini is for 1990 and the data are obtained from Castelló and Doménech (2001). The land-ownership Gini data are from the period 1960-70 and come from Deininger and Olinto (2000). The ELF index is for 1960 and uses data from Mauro (1995) measuring the probability that two randomly selected individuals in a country belong to different ethnolinguistic groups. With the exception of religious homogeneity, increases in the measures correspond to increases in social divergence. Thus, we would expect a positive correlation for TFP and labour

## Social Divergence and Productivity: Making a Connection

CHART 1

Scatter Plot of Religious Homogeneity (RH) and TFP

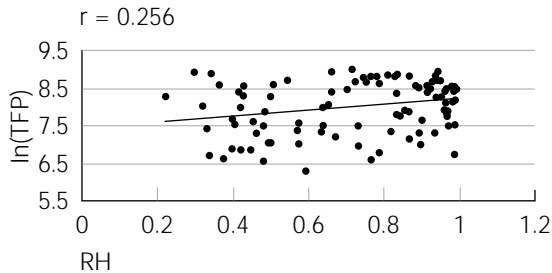


CHART 2

Scatter Plot of Educational Gini and TFP

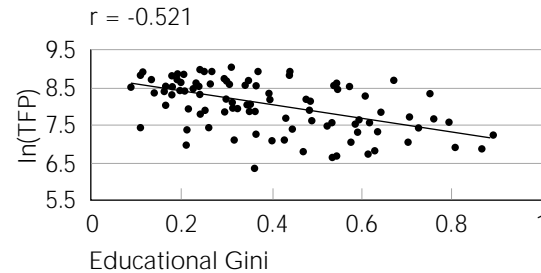


CHART 3

Scatter Plot of Ethnolinguistic  
Fractionalization (ELF) Index and TFP

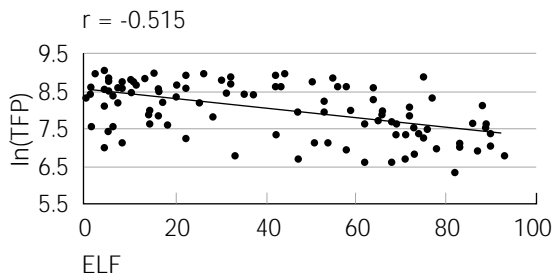
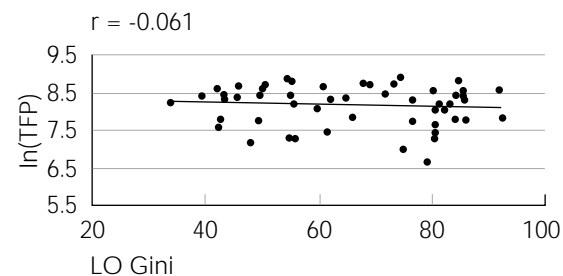


CHART 4

Scatter Plot of Land-Ownership (LO) Gini  
and TFP



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productivity with the variable religious homogeneity and a negative correlation with all the other variables. The number of countries with data available to test the association between TFP and the measures of social divergence are: 96 (religious homogeneity), 95 (educational Gini), 52 (land-ownership Gini) and 100 (ELF index).

### Total Factor Productivity

We present simple correlations and bivariate scatter plots between the chosen measures of social divergence and the (natural log of) estimates of TFP for 1988 from Hall and Jones (1999).<sup>18</sup> At best, such an exercise can be only suggestive; the existence of a statistically significant negative correlation between ln(TFP) and a measure of social divergence does not necessarily imply a causal relationship. The corre-

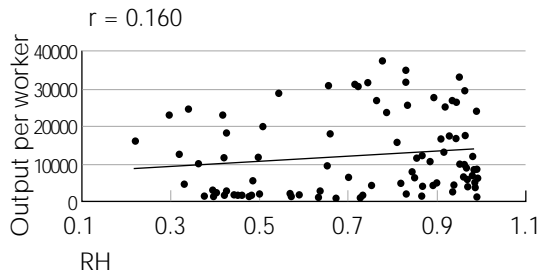
lations between ln(TFP) and the measures of social divergence are 0.256 (religious homogeneity), -0.521 (educational Gini), -0.515 (ELF index) and -0.061 (land-ownership Gini). Scatter plots of the relationships are presented in Charts 1 to 4. With the exception of the land-ownership Gini, there appears to be a substantial association between TFP and the measures of social divergence.

### Labour Productivity

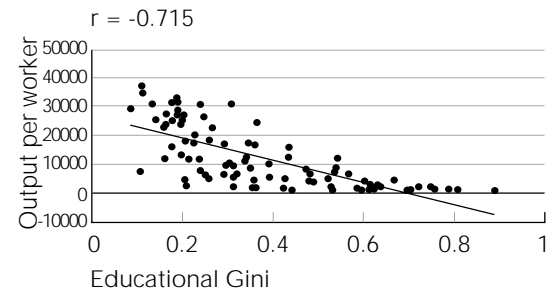
Estimates of output per worker, herein defined as labour productivity, for 1990 come from the Penn World Tables v5.6. Correlations between labour productivity and the measures of social divergence are 0.160 (religious homogeneity), -0.715 (educational Gini), -0.130 (land-ownership Gini) and -0.452 (ELF index). Scatter plots of the

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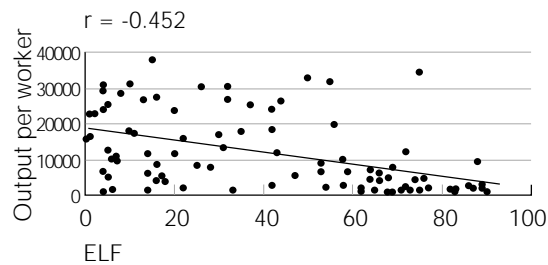
**CHART 5**  
Scatter Plot of Religious Homogeneity (RH)  
and Output Per Worker



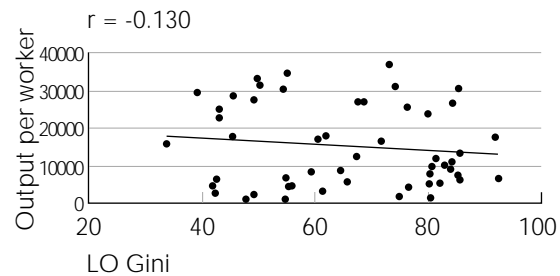
**CHART 6**  
Scatter Plot of Educational Gini and Output  
Per Worker



216 **CHART 7**  
Scatter Plot of Ethnolinguistic Fractionalization  
(ELF) Index and Output Per Worker



**CHART 8**  
Scatter Plot of Land-Ownership (LO) Gini and  
Output per Worker



associations are provided in Charts 5 to 8. The correlations suggest that the measures of social divergence are associated with labour productivity.

### Empirical Relationships

To quantify the importance of measures of social divergence for TFP and labour productivity, a model of the empirical relationship should be estimated. In such a model, Grafton et al. (2001) compare the predicted mean TFP levels of countries in the highest and lowest quartile of countries sorted in ascending order for their measures of social divergence. For each of their explanatory variables (religious homogeneity, ELF index and a personal expenditure Gini), they found that the mean TFP levels of those countries in

the lowest quartile in terms of social divergence were, on average, more than twice those of countries in the highest quartile. Their simulation results imply that, for the countries in their sample, those with the highest levels of social divergence could double their levels of TFP (and hence labour productivity) if they could reduce their levels of social divergence to those of the low-social-divergence countries.

The associations between social divergence and TFP (and labour productivity) and the empirical work of Grafton et al. (2001) are consistent with the hypothesized productivity-social divergence relationships. Nevertheless, there are alternative explanations for the results, especially in terms of the association between social divergence and output per worker. For example, the social capital literature indicates

that high ethnic diversity is associated with lower levels of trust, which, in turn, is correlated with lower growth rates (Zak and Knack 2001). In addition, Hall and Jones (1999) have developed the concept of social infrastructure, which combines an index of government antidiversion policies and the level of openness to international trade. Antidiversion policies are defined as those which divert resources from their most productive use (e.g., distortionary taxes, trade barriers and corrupt practices).<sup>19</sup> They find that their measure of social infrastructure is the primary determinant of total output per worker in a sample of 79 countries. Whatever the explanation or mix of factors, the empirical evidence suggests that measures of social divergence, civic social capital (especially trust) and public social capital (especially corruption) have a significant effect on economic performance.

Further work is, however, needed to provide more robust evidence for a causal relationship<sup>20</sup> between social divergence and economic performance using a sample of both rich and poor nations. Such a study could test for differences between rich and poor nations and determine whether, for example, the higher levels of education overall and mass communications in richer nations mitigate the negative effects of social divergence.

#### IMPLICATIONS FOR POLICY AND FUTURE RESEARCH

The hypothesis that social barriers to communication across social groups can affect productivity requires further study. In particular, our chosen indicators of social divergence are proxies for the number of groups (religious

homogeneity, ELF index) and distance between social groups (educational Gini, land-ownership Gini); they do not distinguish between subjective and objective divergence because they are *not* direct measures of the number or quality of links or exchanges across individuals. For example, impediments to knowledge spillovers at the micro level would include those that separate scholars in different disciplines. Such differences would not be identified with broad societal measures of social divergence, but could be important because of the potentially significant synergies and cross-fertilization of ideas from interdisciplinary activities and communication.

Ideally, physical measures of the quantity and quality of exchanges within and across social groups would more directly indicate the impact of social divergence, enhancing our ability to discriminate between a social divergence explanation of the associations reported and other explanations. On a micro level, physical measures of exchange could include the number, direction and connectivity of electronic mail within organizations. Such measures could reveal the existence of clusters of communications and provide evidence of like-with-like groups within the organizational network that may be similar to the notion of self-forming neighbourhoods (Schelling 1978). Where such measures exist, they could provide evidence of social barriers to communication that may affect micro-level productivity. For example, *The Economist* (2001) reports on work at CERN (the European particle-physics laboratory) indicating that communications links established for past research projects persist and may hinder the development of links required for new research projects.

Further work on social divergence might include its relationship to the emergence of complex social systems. For instance, in the world of

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social insects the organization and coordination of building activities depend upon the nest structure itself, in a process called *stigmergy* (Bonabeau et al. 1999). To the extent that social groups are self-organized, in the sense that complex behaviour can arise from simple individual interactions, the interplay of the physical structures of communication and individual interactions may help determine the level and quality of inter- and intra-group interactions on a societal level. For example, the number and diversity of languages in the highlands of Papua New Guinea are a result of high and steep mountains that have hindered trade and communication between settlements for thousands of years. Even in a modern economy with a well-developed infrastructure, geographical features may result in differential access to modes of communication, thus reinforcing existing like-with-like social interactions on a regional level or accentuating a rural-urban divide. Physical and human geography also determine population density, which may, in turn, influence the number and quality of interactions between individuals and thus the social barriers to communication.

Another issue worthy of further research is whether social divergence can explain the self-organization of social networks with clusters of like-with-like interactions. For instance, geographically localized knowledge about domestic patents and patent citations (Jaffe et al. 1993) is economically important and provides evidence for the importance of localized networks. Further, agglomeration economies that explain why firms of a similar type locate near each other may simply be manifestations of spillovers that arise when social barriers to communication are lowered due to proximity and increased social exchange. In this sense, social divergence provides a social analogue to the self-organizing behaviour found in large

networks with a complex topology. In such networks, as when firms preferentially locate with like firms or when innovations are localized and clustered, new connections are preferentially linked to vertices/points/agents that already have a large number of connections (Barabási and Albert 1999).

If further work supports our hypothesis, especially concerning the existence of a significant relationship between social divergence and TFP in both rich and poor countries, our study could have important policy implications, in particular for how policy-makers might increase productivity for a given level of social divergence. Easterly (2001*a*) observes that improvements in the quality of institutions can mitigate the potentially negative effects of ethnic diversity on economic performance. In reference to social divergence, we might argue that economies with well-developed mass communications and physical infrastructure can increase communication and exchange across social groups for a given level of social divergence. Similarly, comprehensive schooling and inclusive and outward-focused curricula, cross-cultural and cross-religious exchanges, and support for common national languages may also reduce social barriers to communication.<sup>21</sup> Thus, there are social and economic policies that can increase exchange across social groups. Indeed, to some extent such policies have been pursued in Canada and other countries, but for social rather than economic reasons. For example, Canada's policy of multiculturalism is intended to promote cross-cultural understanding, while one of the aims of bilingualism is to overcome the communication barriers of the English-French divide. The postulated social divergence-productivity relationship would suggest that such policies could also help raise Canada's long-term level of TFP.



## CONCLUDING REMARKS

This chapter presents preliminary evidence on the hypothesis that social divergence, the social barriers to communication across social groups, inhibits the exchange of productivity-enhancing ideas in an economy. Using cross-country data we find an association between three proxies of social divergence and TFP and labour productivity. This finding is supported by regressions in a smaller sample of poor countries that indicate a statistically and economically significant negative relationship between measures of social divergence and TFP (Grafton et al. 2001).

If the productivity-social divergence hypothesis is supported in further empirical work, especially in rich and poor countries, it provides a number of important policy implications. First and foremost is the implication that policies to lower social barriers to communication may have a substantial economic payoff in terms of higher TFP and labour productivity. Such policies could include raising the level of mass communications and improving physical infrastructure to mitigate social barriers to communication, developing school curricula that foster an open and outward-oriented approach to learning, cross-cultural and cross-religious exchanges, and language training for recent immigrants. To some extent, Canada has implemented such policies, but to achieve social rather than economic objectives. Our study suggests that, if bilingualism has helped to overcome linguistic divisions and if multiculturalism has promoted cross-cultural understanding, these cornerstones of Canada's cultural policies may have important economic benefits by raising the long-term level of TFP.

## NOTES

- We are grateful for financial support from the Marsden Fund, administered by the Royal Society of New Zealand. We thank Keith Banting, Tue Gorgens, Andrew Sharpe, France St-Hilaire and an anonymous reviewer for helpful comments on earlier versions of the paper. Authorship is alphabetical.
- 1 TFP is an index of how efficiently inputs (such as labour, human capital and physical capital) are transformed into final goods and services. For example, if country A requires twice as many inputs to produce a given level of output as country B, then country A's level of TFP is only half that of country B's.
  - 2 A recent and detailed review of Canadian productivity performance is provided by Baldwin et al. (2001). Sharpe (2001) provides a useful comparison of the economic and productivity trends in Canada and the United States over the 1990s.
  - 3 Dasgupta (2000) notes that networks that act as "economic enclaves" can retard economic development by constraining the flow of resources (labour, financial capital, knowledge, ideas, etc.) across groups, creating inefficiency.
  - 4 In the terminology of social network analysis (Scott 2000), Figure 2 may be described as a 1-clique of size 4 in that all points (individuals) in the graph are directly connected with each other.
  - 5 For instance, in an economy with 100 individuals and zero social communication costs, the maximum number of pair-wise communication links is 4,950. If the same economy had just two social groups (and no communication links across groups) the maximum number of pair-wise links is 2,450, with 10 groups the maximum number of links is 450 and with 100 groups the number of links is zero. As  $M$  increases, other things may not remain equal; as  $M \gg N$ , barriers between groups may be lessened as the situation starts to approximate that of  $M$  heterogeneous individuals rather than  $M$  "groups."
  - 6 For instance, J.S. Mill (1848) shrewdly observed that "it is hardly possible to overrate the value...of placing human beings in contact with persons dissimilar to themselves, and with modes of thought and action unlike those with which they are familiar" (594).
  - 7 Gradstein and Justman (2000) adopt a similar stance. In their model, the productivity of a transaction reflects the balance between the probability of a "successful" transaction, which decreases with social (or "cultural") distance, and the conditional productivity of the transaction, which may increase with social distance. Like us, they assume that, beyond some relatively low level of social distance, productivity is a decreasing function of social distance.

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- 8 Jenson (1998) points out that a concept such as “social cohesion” is a “contested concept,” the interpretation of which can depend on different underlying theoretical traditions. Given the breadth of interest from different disciplines, and from policy-makers as well as academics, the lack of consensus is not altogether surprising.
- 9 In Woolcock’s (2001) view, “there is an emerging consensus on the definition of social capital... social capital refers to the norms and networks that facilitate collective action” (70).
- 10 An alternative, broader view of social divergence would be as an umbrella concept that emphasizes the effects of different dimensions of social distance on productivity and growth. However, as discussed below, there are several hypothesized mechanisms by which each of the different dimensions of social distance affect economic performance, so an encompassing view would be subject to the same criticisms applied above to social capital and social cohesion.
- 11 Easterly (2001*d*) succinctly summarizes this view: “divided societies’ governments face incentives to redistribute existing income. In more cohesive societies, governments face incentives to promote development” (256).
- 12 By contrast, Lian and Oneal (1997) construct their own index of diversity, which includes (equally weighted and standardized) components for ethnic, linguistic and religious diversity, and find that it is not statistically significant in an otherwise conventional growth regression.
- 13 There is some debate over whether fragmentation or inequality (as measured by the ELF index), polarization (which is maximized with only two different groups) or dominance (measured by the proportion of the population in the largest ethnic group) is the most relevant aspect in assessing the effects of ethnic division on economic performance (Collier 2001).
- 14 We are grateful to an anonymous reviewer for this point.
- 15 To reduce the potential overlap with mechanisms that affect factor accumulation (labour, physical capital and human capital), Grafton et al. (2001) focus specifically on the effects of proxies for social divergence on TFP.
- 16 The exclusion of developed countries and the small sample are a consequence of the decision to use only consistently measured data for expenditure inequality that are also labelled “reliable.”
- 17 Sargent and Rodriguez (2000) observe that both TFP and labour productivity are appropriate productivity

measures. Where the interest is over long periods of time (greater than 10 years), TFP may be a better choice provided that capital stock data are comparable across countries.

- 18 Note that the associations summarized are based on variation across countries, not over time. Such correlations should be relatively robust to the different dates at which the indicators of divergence are measured as these vary relatively little over time compared to their variation across countries.
- 19 Hall and Jone’s index of government antidiversion policies is, for each country, an equally weighted average of five ratings related to law and order, bureaucratic quality, corruption, risk of appropriation and government repudiation of contracts, compiled by Political Risk Services.
- 20 See, for example, Durlauf’s (2002) critique of Putnam’s (2000) empirical evidence.
- 21 These policies are complementary to those reviewed by Helliwell (2001) for Canada from a social capital perspective.

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